

Ph.D. position in environmental chemistry / analytical chemistry / soil chemistry



Probing the reactivity of microbial micronutrient shuttles to enhance crop nutrition and disease resistance

Background

Fungi, bacteria, and graminaceous plants produce so called siderophores to shuttle the micronutrient iron from the extracellular environment to the cell. Siderophores provide a growth advantage when bioavailable iron is limiting, but the total iron pool in the medium is replete. Such conditions are encountered in soil, particularly in the biologically active plant root environment. The outcome of competition for iron with siderophores connects soil chemistry to microbial activity and is critical for plant disease resistance. For a siderophore to function, it must travel from the cell or root to an iron source and then back to the organism. However, the chemistry involved in iron-siderophore-soil interactions is poorly understood. Adsorption to soil particles or competition with other metals may disrupt the nutrient uptake process, and it is unknown which siderophore structure may be advantageous under which soil chemical condition.

Project details

This project will track the fate of siderophores and quantify their reactions with specific soil components. You will establish quantitative kinetic and thermodynamic relationships for reactions and use new analytical methods based on liquid-chromatography mass-spectrometry, ICP-MS, and surface spectroscopy to provide spatially and temporally resolved insight. The outcomes of this study will help to manage agricultural systems better so that nutrient deficiencies and crop disease susceptibility are minimized.

Studying at North Carolina State University

NC State University is located in Raleigh (North Carolina) and has been repeatedly highlighted as one of the best places to live ([Money magazine's 6 Best Big Cities](#) and [US News and World Report's best place to live, things to do in Raleigh](#)). NC State University anchors the Research Triangle Park (RTP), one of the country's largest and most successful high-tech research parks. RTP is the home of many of the country's leading Fortune 500 companies. There are many leading research and technology institutions only minutes away from the University. This creates a collaborative environment for both business and innovation with NC State. More information about graduate studies at NC State University can be found at <https://grad.ncsu.edu/students/>

Application requirements

Requirements for this position include a BSc or MS in Chemistry, Microbiology, Geochemistry, or related field and an interest in instrumental analysis. Please send your application, including a cover letter, a Curriculum Vitae, and transcripts to Dr. Oliver Baars (obaars@ncsu.edu).

For more information, please contact Dr. Oliver Baars (obaars@ncsu.edu)

Application deadline: 01 November 2020